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## (54) Improvements in or relating to a chair

(57) A collapsible chair comprises two frame elements 1, 4 which define, respectively, the rear legs 2, 3 and the front legs 5, 6 of the chair. The frame elements are pivotally interconnected so that the frame elements can be moved to a collapsed position, where the frame elements are substantially

in a common plane, and to an erected position, where the frame elements are angularly separated. The chair also comprises a seat 11 on a frame 10 that is pivotally connected at 13, 14 to the rear legs. When the frame elements are in the collapsed position the seat lies substantially in the common plane. The various components of the chair are such that a second identical erected chair may be stacked on the said erected chair with the frame elements of the second chair being substantially parallel with, and nested with, the corresponding frame elements 1, 4 of the first chair.

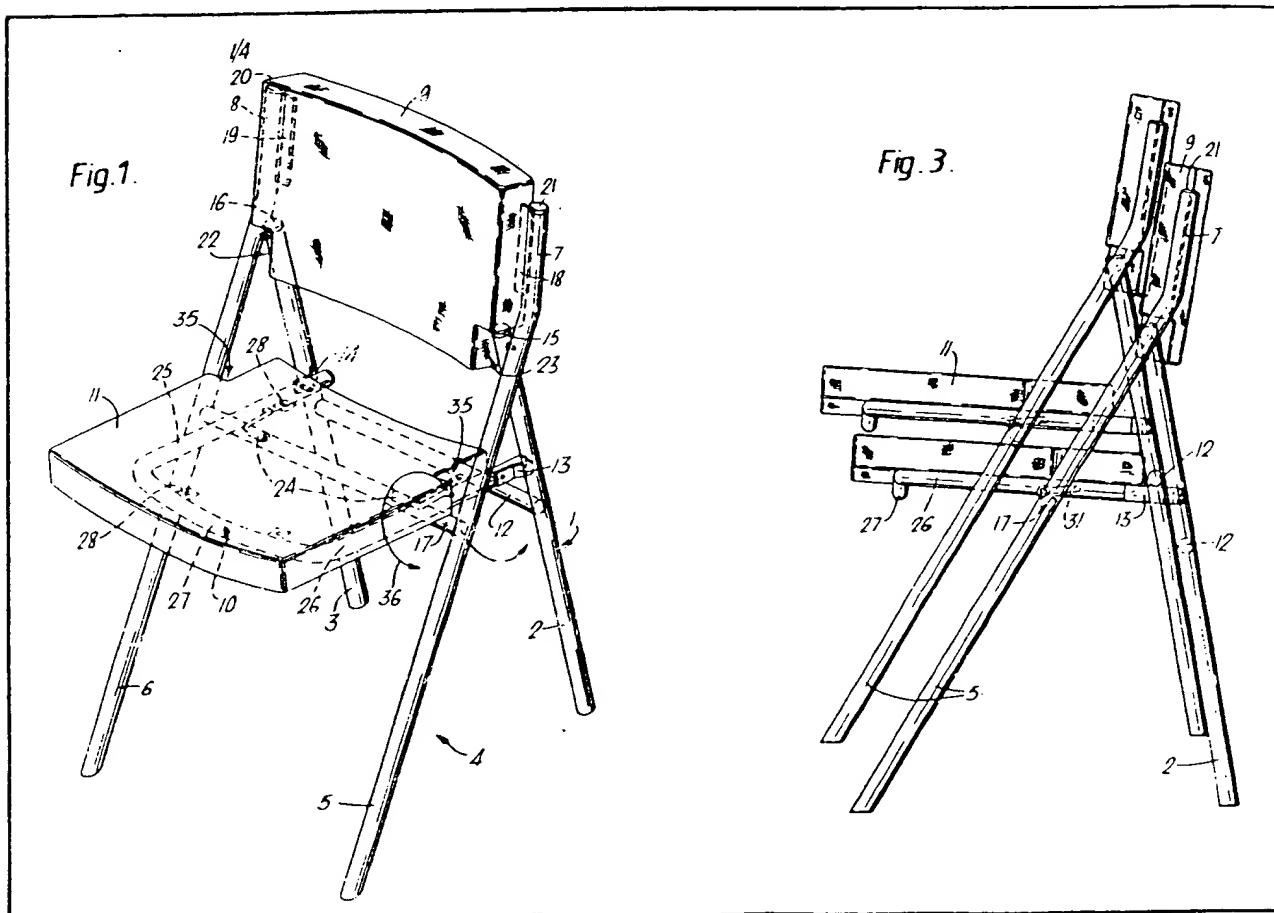
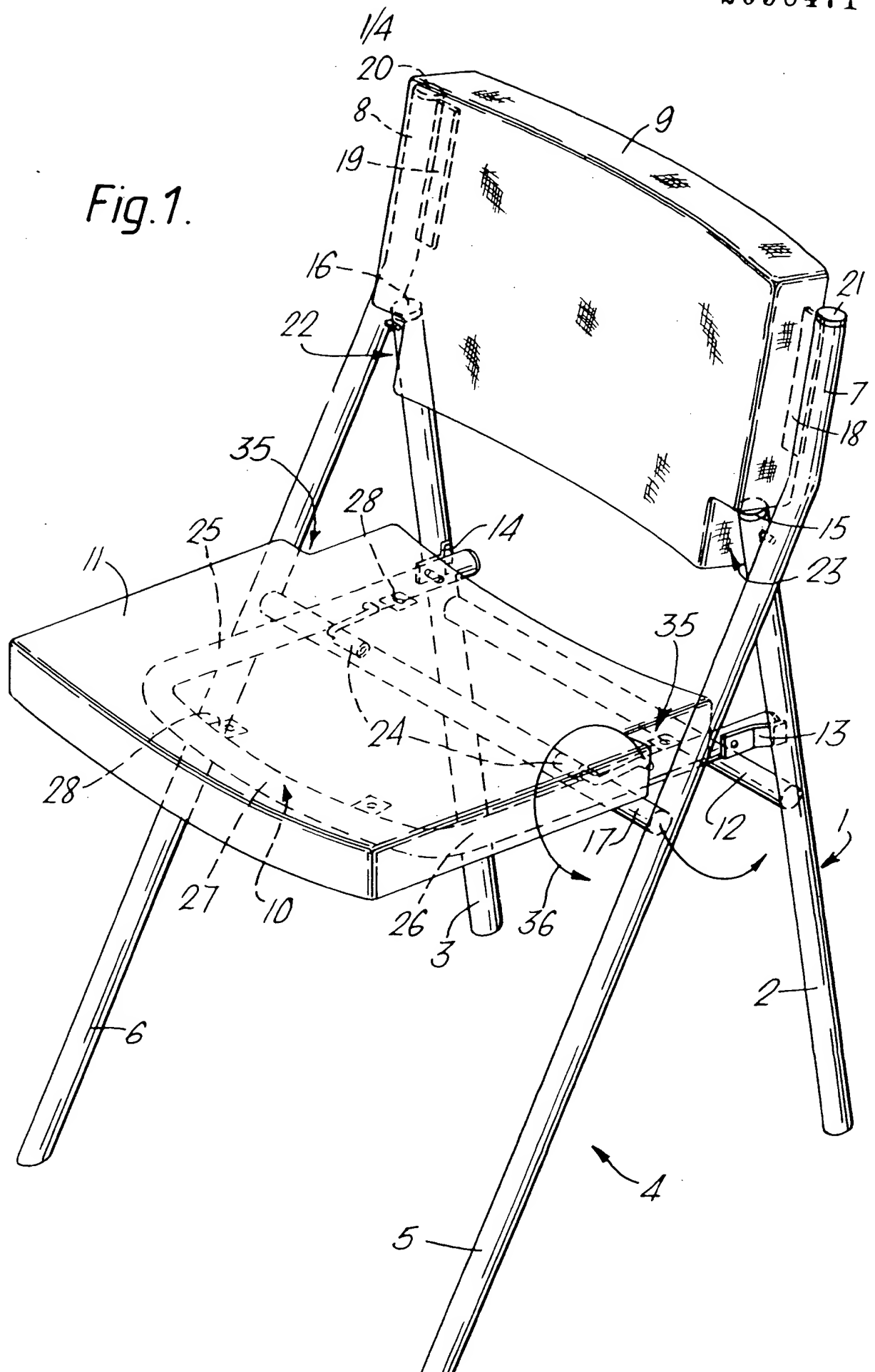
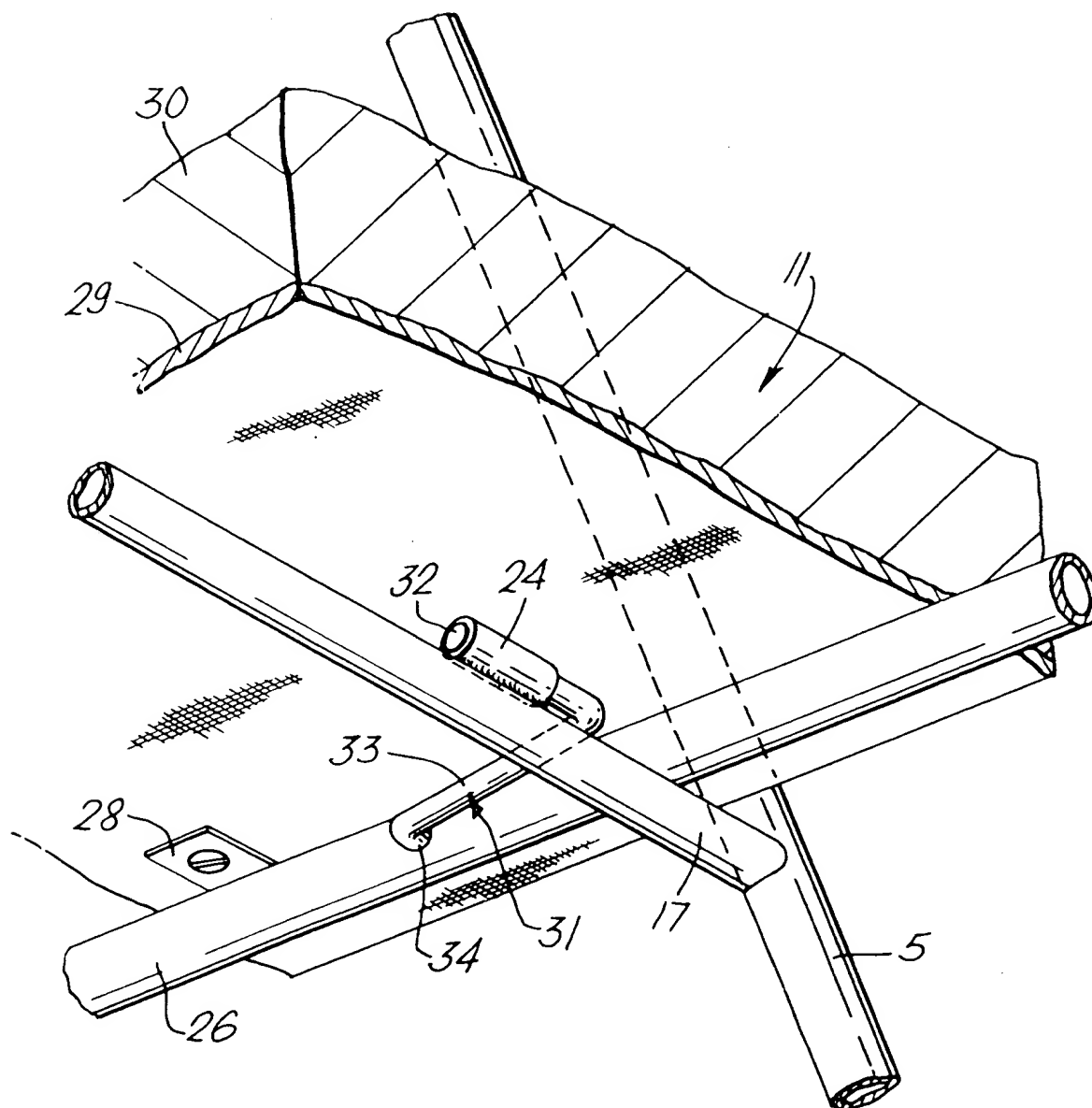


Fig. 1.



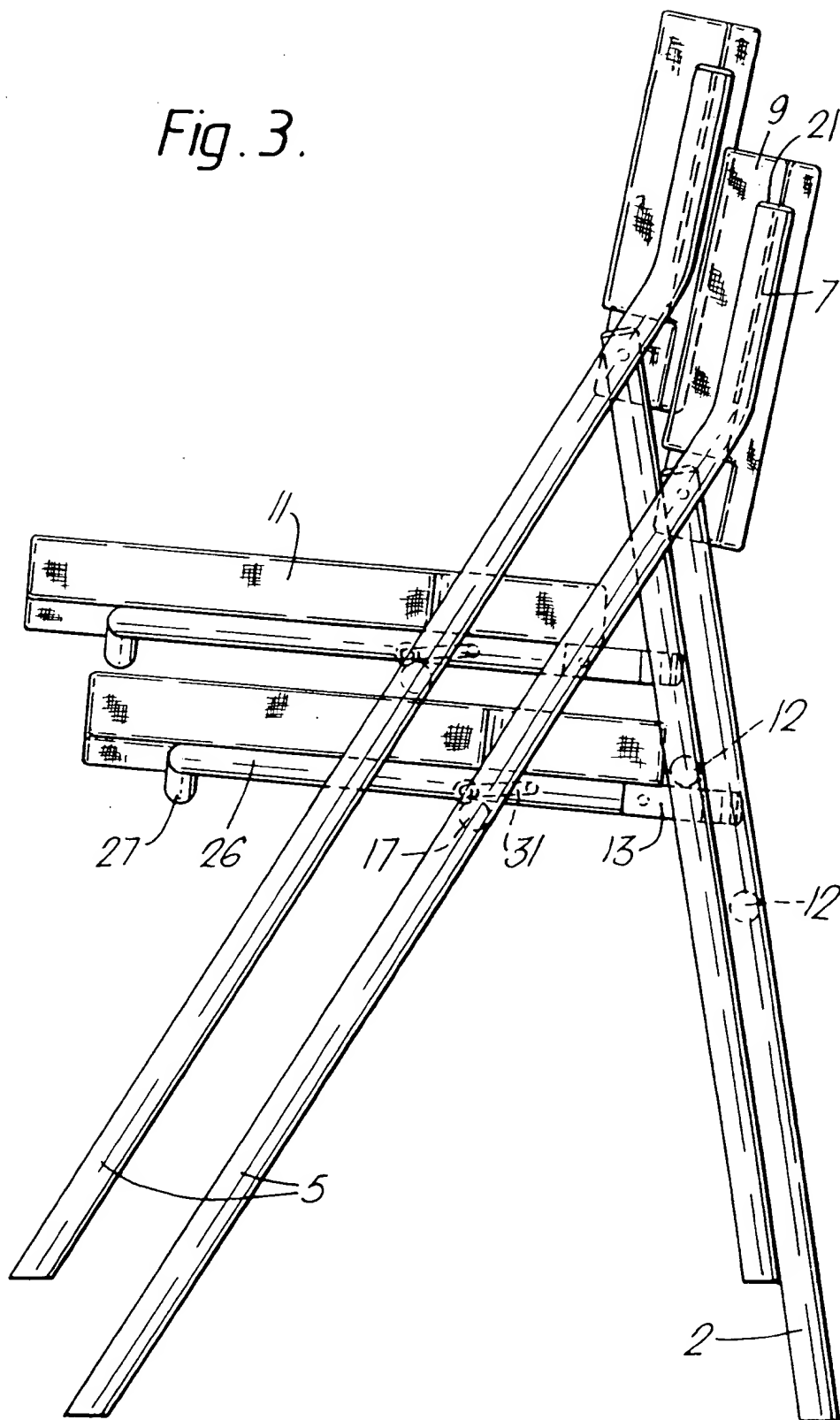
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Fig. 2.



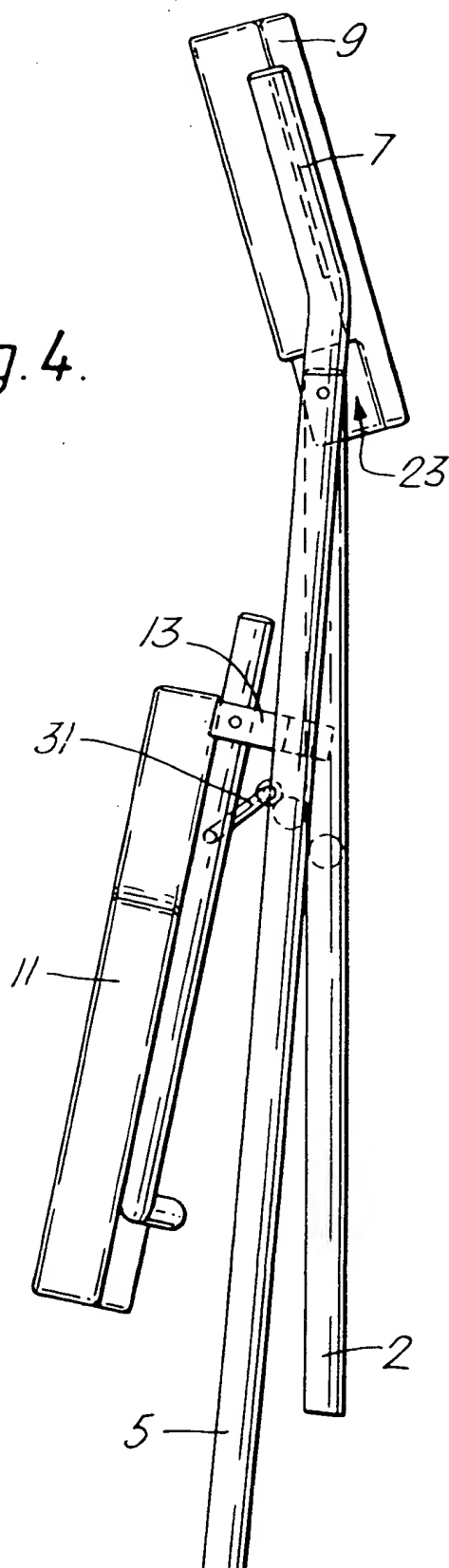
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Fig. 3.



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Fig. 4.



## SPECIFICATION

## Improvements in or relating to a chair

This invention relates to a chair.

It has been proposed to provide collapsible  
5 chairs, the chairs being capable of being folded substantially flat for storage purposes. Whilst the ability to store such chairs in a small space is advantageous when long term storage is considered, it is often found to be inconvenient to  
10 collapse the chairs every time they are not needed, and subsequently to re-erect the chairs.

The present invention seeks to provide an improved collapsible chair which reduces or obviates the above described disadvantages of  
15 prior collapsible chairs.

According to this invention there is provided a collapsible chair comprising two frame elements defining, respectively, the rear and front legs of the chair, the said frame elements being pivotally  
20 interconnected so that the frame elements can be moved to a collapsed position, where the frame elements are substantially in a common plane, and to an erected position, where the frame elements are angularly separated, said chair also  
25 comprising a seat pivotally connected to one of the frame elements, so that when the frame elements are in the collapsed position the seat lies substantially in said common plane, and when the frame elements are in the erected position the  
30 seat is ready for use, the frame elements being such that a second identical chair may be stacked on the said chair, with the frame elements of the second chair being substantially parallel with the corresponding frame elements of the first chair.

Preferably one of said frame elements  
35 comprises two elongate members defining two legs of the chair, interconnected by a transverse member, and the second frame element also comprises two elongate members defining two  
40 legs of the chair interconnected by a transverse member. In a preferred embodiment the frame element defining the rear legs of the chair is of lesser width than the frame element defining the front legs of the chair, and the seat is pivotally  
45 connected to said frame element defining the rear legs of the chair. Thus the frame element defining the rear legs of the chair may be provided with two lugs, the seat being pivotally connected to said lugs, and the seat may be provided with a substantially "U" shaped frame supporting seat,  
50 said frame being pivotally connected to said lugs.

Advantageously when said frame element are in the erected condition, the seat is supported by the transverse member interconnecting the front  
55 legs of the chair. Retaining means may be provided for retaining the front legs and the rear legs at a predetermined angular separation when the chair is in the erected position, and said retaining means may comprise a rigid member  
60 that is pivotally connected to the seat and is also pivotally connected to the transverse member interconnecting the front legs. The rigid member may comprise a crank having a first portion rotatably mounted within a member secured to

65 or formed integrally with said transverse member, and having a further portion, the axis of which is spaced from the axis if said first portion located in an aperture in the frame supporting the seat.

70 The chair is preferably such that when a second identical chair is stacked on said chair the frame element defining the rear legs of the first chair is in contact with the frame element defining the rear legs of the first chair over a substantial  
75 part of the length thereof, and the transverse member interconnecting the rear legs of the chair rests on the means by which the seat is pivotally supported. Preferably when a second identical chair is stacked on said first chair the seat of the  
80 second chair, and the frame supporting the seat of the second chair do not contact the seat of the first chair.

The chair may be provided with a back, which may be mounted on one of said frame elements  
85 e.g. on the frame element defining the front legs of the chair. Preferably when a second identical chair is stacked on said chair the back of the second chair does not touch the back of the first chair.

90 The frame element may be formed of tubular stock, and may be chrome plated. Preferably the exposed ends of said frame elements are capped, and the lower ends of the frame elements which rest on the floor when the chair is erected are  
95 provided with glides.

In order that the invention may be more readily understood and so that further features thereof may be appreciated, the invention will now be described by way of example with reference to  
100 the accompanying drawings, in which:

Figure 1 is a perspective view of a chair in accordance with the invention in the erected condition;

Figure 2 is a perspective view, from below, of  
105 part of the chair of Figure 1;

Figure 3 is a side elevational view of two chairs as shown in Figure 1 when stacked together in the erected condition; and

Figure 4 is a side elevation view of the chair of  
110 Figure 1 when folded substantially flat.

A chair in accordance with the present invention as shown in the accompanying drawings, comprises three frame elements that are connected together, the first frame element 1  
115 defining the rear legs 2, 3 of the chair, the second frame element 4 defining the front legs 5, 6 and arms 7, 8 supporting the back 9 of the chair, and the third frame element 10 supporting the seat 11 of the chair. The three frame elements 1, 4  
120 and 10 are pivotally interconnected, as will be described hereinafter in greater detail.

The frame elements 1, 4 and 10 will be described in the position that they occupy when the chair is erected, as shown in Figure 1. The first  
125 frame element 1 that defines the rear legs 2, 3 of the chair comprises two parallel tubular members 2, 3 that define the rear legs of the chair. The members 2, 3 incline forwardly from the bases of the members which rest on the floor. The

members 2, 3 are interconnected at a point intermediate their ends by a horizontal tubular member 12 welded or otherwise secured to the members 2, 3 and herein termed a stacking rail 12. The purpose of this stacking rail 12 will become clear from the following description. Two seat supporting lugs 13, 14 are welded to the members 2, 3 respectively at positions above the stacking rail 12. Each such lug comprises a substantially planar plate, but the plates are cranked or angled inwardly towards one another so that the plates tend to converge. Each plate is provided with an integral inwardly directed pin at the free end thereof, and the seat portion 11 is pivotally mounted on these pins, as will be described hereinafter. The exposed ends of the members 2, 3 forming the frame are suitably capped 15, 16, at the upper ends, and provided with appropriate glides or the like at the lower ends thereof. Appropriate outwardly directed pins are provided adjacent the upper ends of the members 2, 3 to enable the described frame element 1 to be pivotally connected to the second frame element 4 that defines the front legs 5, 6 of the chair.

The second frame element 4 that defines the front legs 5, 6 of the chair comprises two tubular members 5, 6 which are interconnected, intermediate their ends, by a horizontal tubular rail 17 welded to the members 5, 6 and which can be considered to be a seat supporting rail 17. With the chair in the erected position the tubular members 5, 6 defining the front legs extend rearwardly from the bases of the members 5, 6 that rest on the floor, and pass on the two outer edges of the first frame element 1. The tubular members 5, 6 have apertures formed in the sidewalls thereof so that the members 5, 6 can be sprung apart and then released when the said apertures are aligned with the said outwardly directed pins on the members 2, 3 of the first frame element 1. Thus the two frame elements 1 and 4 can be pivotally interconnected. A nylon washer can be mounted on each of the pins between the tubular members of the frame elements.

Above the point of pivotal connection between the frame elements 1 and 4 the two tubular members of the second frame element 4 bent to form the arms 7, 8 which extend substantially vertically upwardly. These arms 7, 8 are provided with inwardly directed plates 18, 19 which are welded or otherwise secured to the arms, the plates being adapted to support the back 9. The open upper ends of the arms 7, 8 are appropriately capped 20, 21 and the lower end of the tubes are provided with appropriate glides. The back 9 comprises a rigid rear member, such as a member of plywood or the like, which is connected to the two inwardly directed plates 18, 19 there being a padding or foam material mounted on the front face of the plywood, and the entire back being appropriately upholstered. The back 9 is of substantially rectangular configuration, but

recesses 22, 23 are provided adjacent the two bottom corners of the back 9 to accommodate the upper ends of the tubular members 2, 3 defining the rear legs of the chair (shown in Figure 2).

Two short sections of tube 24, of lesser diameter than the tubing forming the rest of the frame, are welded to the seat support rail 17 at positions which are located on the front side of the rail when the chair is in the erected position. The purpose of the short lengths of tube 24 will become clear from the following description.

The third frame element 10 of substantially "U" shape, comprising two parallel arms 25, 26 and an interconnecting arm 27. The parallel arms 25, 26 are provided with appropriately located apertures so that the arms can be sprung inwardly and then released when the apertures are aligned with each a respective pivot pin provided on a seat supporting lug 13, 14 as described above, thus pivotally interconnecting the first and third frame elements 1, 10. Again, nylon washers can be mounted on the pivot pins between the tubular members of the pivotally interconnected frame elements.

The third frame element 10 is substantially planar, but, when viewed from the front when the chair is in the assembled position, the central portion of the part of the frame that interconnects the two parallel arms may be of arcuate or dished-configuration to enable a comfortably shaped seat 11 to be mounted on the frame. The frame element 10 has four inwardly directed lugs 28 (one of which is shown clearly in Figure 2) welded to it, the lugs being apertured to enable screws or the like to be utilised to secure the seat 11 to the frame element 10. The seat 11 may comprise a rigid member of plywood 29 or the like supporting appropriate foam 30 or other cushioning material, the seat unit being upholstered in a conventional manner. The two exposed ends of the tubular member forming the third frame element 10 are capped.

Two crank members 31 are provided, each crank member being formed of appropriate rod, as is shown most clearly in Figure 2. Each crank member 31 has a portion 32 that extends through a respective one of the short tubular members 24 welded to the seat supporting rail 17. A further portion 33 of each crank member extends perpendicularly to that first portion for a predetermined distance, and a third, final, portion 34 of each crank member extends parallel to the first portion 32, but on the opposite side of the axis defined by the second portion 33. This third portion 34 is inserted into an appropriate aperture formed in the arms 25, 26 of the third frame element 10. Of course, the axis of the third portion is spaced from the axis of the first portion.

It is to be noted that the rear legs 2, 3 are located inwardly of the front legs 5, 6 of the chair, and thus the overall width of the frame element 4 defining the front legs 5, 6 is greater than the overall width of the frame element 1 defining the rear legs 2, 3. It is also to be noted that the seat

11 is not of strictly rectangular configuration, but is narrower adjacent its rear edge, thus defining recesses 35 which terminate immediately adjacent the front legs 5, 6 of the chair, when the chair is in the erected position. The inwardly inclined lugs 13, 14 are such that they do not block the recesses 35.

A plurality of chairs, as described above, can be stacked one upon the other when the chairs are in the erected position, as is shown in Figure 3.

When a second chair is to be stacked on a first chair the rear legs 2, 3 of the second chair are inserted in the recess 35 defined between the frame element defining the front legs 5, 6 of the first chair, the reduced width portion of the seat 11 of the first chair, and the lugs 13, 14. The second chair is then moved downwardly, in alignment with the first chair until the stacking rail 12 of the second chair impinges upon the tops of the seat supporting lugs 13, 14 of the first chair. The frame defining the rear legs 2, 3 of the second chair then abuts against the frame defining the rear legs 2, 3 of the first chair in such a way that second chair is supported with the seat supporting rail 17, and the remaining components, of the second chair do not touch the upholstery on the seat of the first chair. Similarly the back of the second chair does not touch the back of the first chair. Thus the upholstery provided on the seat and back of any chair is not damaged when a further chair is stacked upon it. The first and second frame elements of the first chair are substantially parallel to the first and second frame elements respectively, of the second chair.

It will be appreciated that several chairs can be stacked one upon the other, the dimensions of the recesses 35 being such that, regardless of the number of chairs in the stack, the rear legs of any chair will not engage the seat 11 of any lower chair.

When the chair is in the erected position, as shown in Figure 1, with the frame elements angularly separated, the described crank member 31 extends from the short tubular members 24 welded to the seat supporting rail 17 to the apertures in the side arms of the seat frame, and the crank is rigid, thus rigidly maintaining the front legs 5, 6 in the desired position, and resisting any tendency for the chair to collapse. Thus, when any person sits upon the chair the front legs 5, 6 are held firmly in their forwardly directed position, and there is no tendency for the chair to collapse, even if the person tilts the chair up upon its rear legs 2, 3 only.

It is to be appreciated that the above described chair is a so-called "contract" chair and such chairs will be used at public functions, and will be offered for hire. Thus the chairs must be safe and must be able to withstand a certain amount of mis-use without any danger.

As has been mentioned, when a person sits upon the chair the front legs are held firmly in their forwardly directed position. Also, the thrust of the seat towards the back legs is through the

pivotal connections between the frame element 10 and the frame element 1, the force being in a straight line. Thus, if a person sitting on the chair tilts the chair back up on to its rear legs only the seat does not tend to pivot or move relatively to the back legs, and even if a person sitting on the chair tilts the chair forwardly up on its front legs only, there is no tendency for the chair to collapse. This is in contrast with many prior proposed

folding chairs where the seat is connected to at least one pair of legs by means of a sliding arrangement, and if such a chair is tipped up onto only one pair of legs there is a tendency for the chair to collapse.

When it is desired to fold the chair, the front edge of the seat 11 can be grasped, the seat then being lifted upwardly about the pivotal connection between the seat frames 10 and the seat supporting lugs 13, 14. As the seat is pivoted so the crank will rotate, both the first and third portions of each crank rotating. The rotation of the crank is schematically shown by the arrow 36. As the crank 31 rotates, so the frame element 4 defining the front legs 5, 6 will pivot relative to the frame element 1 defining the rear legs 2, 3, bringing the frames towards a common plane. The pivoting movement is shown schematically by the arrow 37. As this motion continues so the crank will constrain the seat to be pivoted downwardly, and the final result is that the two frames defining the legs are in a substantially coplanar condition, and the seat frame is also substantially coaligned with those frames. Thus the chair can be folded to a substantially flat condition. The chair is shown in Figure 4 almost in the final flat condition.

As can be readily appreciated from the above description when the chair is collapsed the seat is folded downwardly to lie between the legs of the chair. This is in contrast with many prior proposed folding chairs in which, when the chair is folded the seat is folded upwardly to lie adjacent the back of the chair. An advantage of having a seat that folds downwardly away from the back of the chair is that it is practicable to provide the seat, and the back, with a substantial thickness of cushioning or padding. Thus the seat and back of the above described chair may be provided with padding which is, for example, 4 centimetres thick. Of course, it would not be practicable to provide padding of this thickness on many prior proposed folding chairs where the seat folds up to lie adjacent the back when the chair is in the collapsed position.

The pivotal connections between the above described frame elements can be of any conventional form, but are, as described, preferably of a sprung-in type, the frame elements being separated by self-lubricating washers, such as nylon washers. The frame elements may have any desired finish and thus may be painted or chrome plated. The frame elements of the preferred embodiment of a chair as described above are substantially flat, which is advantageous if the frame elements are to be



chrome plated, and also if the frame members are to be polished.

It will be appreciated that when chairs as described above are to be stored temporarily the chairs may be stacked in the erected condition, whereas if the chairs are to be stored for a longer period of time, and if space is at a premium, the chairs can be collapsed and stored in the flat condition.

- 10 Whilst the invention has been described with reference to one particular embodiment of a chair, it is to be appreciated that many modifications may be made without departing from the present invention as defined by the following claims.
- 15 Thus, whilst reference has been made to a seat and a back that are upholstered, it is to be appreciated that seat and back may be covered with leather, a plastics material, or, in rudimentary embodiments of the invention, may merely comprise plywood or canvas seats and backs.
- 20 Also, while the invention has been described with reference to embodiments in which the various frames are made of metal tube, chairs in accordance with the invention may be made of any appropriate material, and thus, for example, may be made of wood. It is also to be appreciated that chairs in accordance with the present invention may be designed to link together and also chairs in accordance with the invention may
- 30 be provided with arms. If arms are provided, the arms may incorporate means to link adjacent chairs together.

#### Claims

1. A collapsible chair comprising two frame elements defining, respectively, the rear and front legs of the chair, the said frame elements being pivotally interconnected so that the frame elements can be moved to a collapsed position, where the frame elements are substantially in a common plane, and to an erected position, where the frame elements are angularly separated, said chair also comprising a seat pivotally connected to one of the frame elements, so that when the frame elements are in the collapsed position the seat lies substantially in said common plane, and when the frame elements are in the erected position the seat is ready for use, the frame elements being such that a second identical chair may be stacked on the said chair, with the frame elements of the second chair being substantially parallel with the corresponding frame elements of the first chair.

2. A collapsible chair according to claim 1 wherein one of said frame elements comprises two elongate members defining two legs of the chair, interconnected by a transverse member, and the second frame element also comprises two elongate members defining two legs of the chair interconnected by a transverse member.

3. A chair according to claim 2 wherein the frame element defining the rear legs of the chair is of lesser width than the frame element defining the front legs of the chair.

- 65 seat is pivotally connected to said frame element defining the rear legs of the chair.

5. A chair according to claim 4 wherein said frame element defining the rear legs of the chair is provided with two lugs, the seat being pivotally connected to said lugs.

6. A chair according to claim 5 wherein the seat is provided with a substantially "U" shaped frame supporting seat, said frame being pivotally connected to said lugs.

7. A chair according to any one of claims 2 to 6 wherein, when said frame elements are in the erected condition, the seat is supported by the transverse member interconnecting the front legs of the chair.

8. A collapsible chair according to any one of claims 2 to 7 provided with retaining means for retaining the front legs and the rear legs at a predetermined angular separation when the chair is in the erected position.

9. A chair according to claim 8 wherein said retaining means comprise a rigid member that is pivotally connected to the seat and is also pivotally connected to the transverse member interconnecting the front legs.

10. A chair according to claim 9 wherein said rigid member comprises a crank having a first portion rotatably mounted within a member secured to or formed integrally with said transverse member, and having a further portion the axis of which is spaced from the axis of said first portion located in an aperture in the frame supporting the seat.

11. A chair according to any one of claims 2 to 10 wherein, when a second identical chair is stacked on said chair the frame element defining the rear legs of the first chair is in contact with the frame element defining the rear legs of the first chair over a substantial part of the length thereof, and the transverse member interconnecting the rear legs of the chair rests on the means by which the seat is pivotally supported.

12. A chair according to claim 11 wherein, when a second identical chair is stacked on said first chair the seat of the second chair, and the frame supporting the seat of the second chair do not contact the seat of the first chair.

13. A chair according to any one of claims 1 to 12 provided with a back.

14. A chair according to claim 13 wherein said back is mounted on one of said frame elements.

15. A chair according to claim 14 wherein said back is mounted on the frame element defining the front legs of the chair.

16. A chair according to any one of claims 1 to 15 wherein, when a second identical chair is stacked on said chair the back of the second chair does not touch the back of the first chair.

17. A chair according to any one of the preceding claims wherein said frame element are formed of tubular stock.

18. A chair according to claim 17 wherein said frame elements are chrome plated.

wherein the exposed ends of said frame elements are capped.

20. A chair according to any one of claims 17 to 19 wherein the lower ends of the frame elements which rest on the floor when the chair is erected are provided with glides.

21. A chair substantially as herein described with reference to and as shown in the accompanying drawings.

22. Any novel feature or combination of features disclosed herein.

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